

CLAIMS

What is claimed is:

1. A feedthrough assembly for an electrochemical cell comprising:
a cover having a top surface and a bottom surface and a hole formed therethrough;
5 an insulator having a top surface and a bottom surface and a hole formed therethrough; and
a pin comprising:
a pin shaft; and
a pinhead having a larger diameter than said pin shaft; wherein
a first portion of said insulator bottom surface is brazed to said top surface said case cover;
10 a second portion of said insulator bottom surface is brazed to said top surface of said
pinhead.
2. The feedthrough assembly of claim 1 wherein a portion of said pin extends into said
insulator hole.
3. The feedthrough assembly of claim 1 wherein a portion of said pin extends above said
15 insulator hole.
4. A sealed battery comprising:
a battery case;
a positive electrode within said case;
a negative electrode within said case;
20 an electrolyte within said case; and
a feedthrough of claim 1 sealing said case, wherein said pin is electrically coupled to one of
said electrodes.
5. The battery of claim 4 wherein said positive and negative electrodes are wound around
said pin.
- 25 6. A feedthrough assembly for an electrochemical cell comprising:

a cover having a hole formed therethrough, said hole having a hole surface;
an insulator having a top surface and a bottom surface and a hole formed therethrough; and
a pin comprising a pinhead and a pin shaft, said pin shaft extending through said insulator
hole and through said cover hole, said pinhead having a larger diameter than said pin
5 shaft; wherein
said bottom surface of said insulator is brazed to a top surface said case cover; and
said insulator is brazed to said pin.

7. The feedthrough assembly of claim 6 wherein said top surface of said insulator is brazed
to an underside of said pinhead.

10 8. The feedthrough assembly of claim 7 wherein said insulator is brazed to a portion of said
pin shaft.

9. The feedthrough assembly of claim 6 wherein said pinhead has a larger diameter than
said cover hole.

15 10. The feedthrough assembly of claim 6 wherein said pinhead and said pin shaft are formed
of one piece of metal.

11. The feedthrough assembly of claim 6 wherein said pinhead and said pin shaft are formed
of more than one piece of metal.

12. The feedthrough assembly of claim 6 wherein said pin shaft has a diameter of about
0.1 mm to about 3 mm.

20 13. The feedthrough assembly of claim 6 wherein said insulator comprises a nonglass
ceramic.

14. A sealed battery comprising:
a battery case;
a positive electrode within said case;

a negative electrode within said case;
an electrolyte within said case; and
a feedthrough of claim 6 sealing said case, wherein said pin is electrically coupled to one of said electrodes.

5 **15.** A feedthrough assembly for an electrochemical cell comprising:
a cover having a hole formed therethrough, said hole having a hole surface;
an insulator having a top surface and a bottom surface and a hole formed therethrough, and
an outer surface having a diameter about the same diameter as said cover hole; and
a pin comprising a pinhead and a pin shaft, said pin shaft extending through said insulator
10 hole and through said cover hole, said pinhead having a larger diameter than said pin
shaft; wherein
said bottom surface of said insulator is brazed to a top surface said case cover; and
said insulator outer surface is brazed to said cover hole surface.

15 **16.** The feedthrough assembly of claim 15 wherein said insulator has a thickness that is
about the same as a thickness of said cover in the region of the cover hole.

17. The feedthrough assembly of claim 15 wherein said top surface of said insulator is
brazed to an underside of said pinhead.

18. The feedthrough assembly of claim 17 wherein said insulator is brazed to a portion of
said pin shaft.

20 **19.** The feedthrough assembly of claim 15 wherein said pinhead and said pin shaft are
formed of one piece of metal.

20. The feedthrough assembly of claim 15 wherein said pinhead and said pin shaft are
formed of more than one piece of metal.

25 **21.** The feedthrough assembly of claim 15 wherein said pin shaft has a diameter of about
0.1 mm to about 3 mm.

22. The feedthrough assembly of claim 15 wherein said insulator comprises a nonglass ceramic.

23. A sealed battery comprising:

a battery case;

5 a positive electrode within said case;

a negative electrode within said case;

an electrolyte within said case; and

a feedthrough of claim 15 sealing said case, wherein said pin is electrically coupled to one of said electrodes.

10 24. The battery of claim 23 wherein said positive and negative electrodes are wound around said pin.

25. A method for making a feedthrough assembly comprising:

providing a case cover having a hole formed therethrough, said hole having a hole surface;

15 providing an insulator having a top surface and a bottom surface and a hole formed therethrough;

providing a pin comprising a pinhead and a pin shaft, said pinhead having a larger diameter than said pin shaft;

brazing said bottom surface of said insulator to a top surface of said cover;

positioning said pin shaft through said insulator hole and through said cover hole; and

20 brazing said pin to said insulator.

26. The method of claim 25 wherein said top surface of said insulator is brazed to an underside of said pinhead.

27. The method of claim 25 wherein said insulator is brazed to a portion of said pin shaft.

28. The method of claim 25 wherein said pinhead has a larger diameter than said cover hole.

29. A method for making a battery comprising:

providing a battery case;

housing a positive electrode within said case;

housing a negative electrode within said case;

5 housing an electrolyte within said case; and

making a feedthrough according to the method of claim 25, coupling one of the electrodes to the pin.

30. A method for making a feedthrough assembly comprising:

providing a case cover having a hole formed therethrough, said hole having a hole surface;

10 providing an insulator having a top surface and a bottom surface and a hole formed therethrough, and an outer surface having a diameter about the same diameter as said cover hole;

providing a pin comprising a pinhead and a pin shaft, said pinhead having a larger diameter than said pin shaft;

15 brazing said insulator outer surface to said cover hole surface;

positioning said pin shaft through said insulator hole and through said cover hole; and

brazing said pin to said insulator.

31. The method of claim 30 wherein said top surface of said insulator is brazed to an underside of said pinhead.

20 **32.** The method of claim 31 wherein said insulator is brazed to a portion of said pin shaft.

33. A method for making a battery comprising:

providing a battery case;

housing a positive electrode within said case;

25 housing a negative electrode within said case;

housing an electrolyte within said case; and

making a feedthrough according to the method of claim 30, coupling one of the electrodes to the pin.